# *Acacia splendens* (Leguminosae : Mimosoideae), a new rare species from near Dandaragan, Western Australia

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## Abstract

Maslin, B.R. and Elliott, C.P. *Acacia splendens* (Leguminosae : Mimosoideae), a new rare species from near Dandaragan, Western Australia. *Nuytsia* 16(1): 81–86 (2006). A new species, *Acacia splendens* Maslin & C.P. Elliott, is described and illustrated. It is most closely related to *A. microbotrya* Benth. and *A. daphnifolia* Meisn. and is geographically restricted to near Dandaragan, Western Australia. *Acacia splendens* is Declared Rare Flora (ranked as Endangered) under the Western Australian Wildlife Conservation Act 1950 and is also listed as Endangered under Commonwealth legislation.

## Introduction

Based on records at the Western Australian Herbarium (PERTH) the first collection of the rare species described below as *Acacia splendens* was made by S.J. Green in 1917 from 'Dandaragan'. No further collections occurred (or at least, none preserved at PERTH) until the early 1980's when the species was brought to the attention of the first author by Mr Alf Popplewell, the plant having been collected by Alf's nephew, Peter Popplewell, in 1981. Popplewell was a farmer and an enthusiastic naturalist with a strong conservation ethic who lived in the Dandaragan area and it was through his initial efforts that the very restricted natural geographic distribution of the species became known. In 1989 *A. splendens* was officially gazetted as a Declared Rare Flora, under the name '*Acacia* sp. Dandaragan (*S. van Leeuwen* 269)'. It was included in the *Flora of Australia* treatment as '*Acacia* sp. D' (Maslin 2001a) and as '*Acacia* affin. *microbotrya*' on the accompanying WATTLE CD (Maslin 2001b).

*Acacia splendens* is a member of the Australia-wide, informal '*Acacia microbotrya* group' (Maslin 1995: 186). Its relationship to presumed closest relatives within this group has been investigated using both allozyme and Random Fragment Length Polymorphism (RFLP) molecular techniques. The allozyme data shows *A. splendens* as clearly distinct from *A. microbotrya* Benth. and *A. daphnifolia* Meisn. (syn. *A. microbotrya* var. *borealis* E. Pritzel, *fide* Maslin in prep.) based on genetic distance ($D = 0.078 \pm 0.009$) and the existence of high genetic differentiation ($F_{ST} = 0.22$) (Elliott *et al*, 2002). A canonical variate analysis of floral and phyllode characters which was conducted as part of this genetic study supported the separation of *A. splendens* from its two relatives. Similarly, a nuclear RFLP study by Byrne *et al.* (unpublished) showed *A. splendens* to be distinct from *A. microbotrya* and *A. daphnifolia*, and from another close relative, *A. amblyophylla* F. Muell.

Based on the above results and from our examination of both herbarium material and plants in the field it is clear that the taxon warrants description, and recognition at the species level seems most

appropriate. *Acacia splendens* is known from just one (large) population which is located in the vicinity of Dandaragan, Western Australia. The area in which the species grows has been extensively cleared for agriculture and it is not impossible that it once had a wider geographic distribution.

## Taxonomy

**Acacia splendens** Maslin & C.P. Elliott, *sp. nov.*

Frutex vel arbor 1–8 m alta. Ramuli glabri, pruinosi. Phyllodia multi-variabiles, (6–)8–12 cm longa; phyllodia juvenales elliptica vel obovata, plerumque 3–6(–8) cm lata, l:w = 1.5–2(–3), ± undulata, rotundata–obtusa; phyllodia matura anguste elliptica vel oblanceolata, plerumque 1–3 cm lata, l:w=4–8, subacuta vel acuminata. Inflorescentiae plerumque racemosae; axes racemulorum (1.5–)2.5–8(–15) cm longi, glabri vel sparse vel moderate appresse pallido aureo tomentosi; pedunculi (3–)4–6(–8) mm longi, indumento ut in axe racemulorum; capitula obloidea vel globularia, aurea, gloriosa, dense (33–)40–60(–75)-flora. Bracteolae spathulatae vel sub-peltatae, 1–1.5 mm longae; laminae fimbriolatae pilis flavis. Flores 5-meri; calyx longitudine ¾ corollae aequantia, gamosepalus, minime vadose dissectus. Legumina anguste oblonga, (7–)8–10(–12) mm lata, glabrum, variabile pruinosa. Semina longitudinalia obliqua in legumen, oblonga vel elliptica vel circularia, 4–6 mm longa, 3–5 mm lata, applanata, ex parte vel omnino per funiculo circumdata.

*Typus:* NE of Dandaragan, Western Australia, 16 May 1986, *B.R. Maslin* 6025 (*holo:* PERTH 00720526; *iso:* K).

Somewhat spindly, open, craggy *shrubs* 1–4 m tall, maturing to erect or spreading *trees* 5–8 m (may reach 10 m in cultivation), single-stemmed or sometimes with up to c. 4 main stems arising from ground level, stems to about 20 cm dbh (on oldest trees, commonly 4–8 cm at ground level on mature shrubs) and sub-straight to crooked; commonly spreading by root suckers. *Bark* smooth, light grey with a white bloom at first, aging rough and dark grey to grey–brown or blackish on main stems, the upper branches similar or smooth and pruinose. *New shoots* light purple. *Branchlets* thick and angled by narrowly winged ribs on young plants, becoming terete, often more slender and ribs not winged with age, glabrous, pruinose. *Phyllodes* very variable (see discussion below), positioned on obvious stem projections, outer edge often continuous with the branchlet rib, glabrous, (6–)8–12 cm long; *juvenile phyllodes* elliptic to obovate, generally 3–6(–8) cm wide with l:w = 1.5–2(–3), straight, coriaceous, ± undulate, glaucous, pruinose, rounded-obtuse; *adult phyllodes* narrowly elliptic to oblanceolate, generally 1–3 cm wide with l:w = 4–8, straight to shallowly recurved, grey–green to sub-glaucous, sub-acute to acuminate; *base* oblique; *midrib* rather prominent, central or slightly excentric; finely penninerved, the smallest veins anastomosing. *Gland* not prominent, situated on upper margin of phyllode 2–6 cm above pulvinus. *Inflorescences* racemose (occasionally some paniculate), racemes single within axils of phyllodes towards ends of branchlets; *raceme axes* (1.5–)2.5–8(–15) cm long with (6–)9–30(–42) heads, glabrous or sparsely to moderately appressed light golden hairy, indumentum densest prior to anthesis; *peduncles* (3–)4–6(–8) mm long, indumentum as on raceme axes; *heads* obloid to globular, golden, showy, densely (33–)40–60(–75)-flowered, 8–12 mm diam. (fresh), 6–9 mm diam. (dry). *Bracteoles* spathulate to sub-peltate, 1–1.5 mm long, claws linear, laminae sub-circular to depressed-trullate, brown and fimbriolate with yellow hairs. *Flowers* 5-merous, 2 mm long; *calyx* ¾ length of corolla, gamosepalous, very shallowly dissected into inflexed, ± rounded lobes which are yellow-hairy and slightly thickened abaxially, calyx tube red–brown (dry) and glabrous; *petals* glabrous to sparsely appressed-hairy (hairs yellow), very obscurely 1-nerved. *Pods* narrowly oblong, straight-edged to ± shallowly constricted

between seeds, occasional deep constrictions occur on some pods, flat but gently rounded over seeds, to 11(–14) cm long but often shorter, (7–)8–10(–12) mm wide, firmly chartaceous to thinly coriaceous, straight to shallowly curved, dehiscing unilaterally, glabrous, purple–brown, variably pruinose, often persisting (in clumps) on plants for some time following dehiscence. *Seeds* longitudinal to oblique in pods, oblong to elliptic or circular, 4–6 mm long, 3–5 mm wide, flattened (2 mm thick), slightly shiny, ± smooth, very dark brown to black; *pleurogram* obscure, continuous; *areole* 2–3 × 1–1.5 mm; *funicle* cream, light brown or dark red–brown (when fresh: colour probably age-dependent), dark red–brown when dry, ¾ to wholly encircling seed in single or double fold; *aril* clavate, creamy white. (Figure 1)

*Selected specimens examined.* WESTERN AUSTRALIA: NE of Dandaragan [precise localities withheld], *R. Cumming* 3559a & b (MEL, PERTH); *C.P. Elliott* 1–9 (all PERTH); *S.J. Green s.n.*, March 1917 (PERTH); *S.D. Hopper* 2378 (PERTH); *S. van Leeuwen* 269 (PERTH); *B.R. Maslin* 5360 (PERTH), 6024 (PERTH), 6116 (MEL, PERTH), 6117–6119 (all PERTH), 6021–6025 (all PERTH); *A. Popplewell s.n., s. dat.* (AD, CANB, NSW, NY, PERTH 00720577) and *s.n.*, 20 Nov. 1981 (PERTH).

*Distribution and habitat.* Known from only a single population NE of Dandaragan, W.A., where it forms a dense stand on slopes and at base of a small laterite breakaway. Grows on brown loamy clay or gravelly loam in Eucalyptus low woodland with little understorey (probably due to former grazing of the site); *Dryandra sessilis* var. *flabellifolia* A.S. George is a common associate. The species does not extend to sandy soils which occur adjacent to the western edge of the population. There are about 111,000 plants in the population but many of these undoubtedly represent ramets of clonal individuals; the frequency of plants varies according to landform, with the highest density (1.22 plants $m^{-2}$) occurring on the colluvial slopes of the breakaway (Elliott *et al.* 2002).

*Flowering and fruiting periods.* The main flowering flush is in May and June. Flowering may commence on plants as small as 1 m tall (but these may be ramets of clonal individuals). Pods with mature seeds have been collected in late November and early December.

*Conservation status.* Conservation Codes for Western Australian Flora: Rare. In 1989 *Acacia splendens* [under the name '*Acacia* sp. Dandaragan (*S. van Leeuwen* 269)'] was formally gazetted as Declared Rare Flora (and ranked as Endangered) under the Western Australian Wildlife Conservation Act 1950 and is currently also listed as Endangered under Commonwealth legislation, namely, the Environment Protection and Biodiversity Conservation Act 1999.

*Etymology.* The specific epithet is derived from the Latin '*splendeo*' (shine) in allusion to the bright golden-coloured flower heads that are produced in great profusion in May and June.

*Affinities.* The new species is most closely related to *A. microbotrya* and *A. daphnifolia* on account of its 1-nerved phyllodes, globular to obloid heads arranged in racemes, seeds encircled by a dark-coloured funicle and more particularly by its gamosepalous calyx, yellow-hairy raceme axes, peduncles, flowers and bracteoles and its overall flower, bracteole and seed morphology. Like its two relatives *A. splendens* may spread by root suckers and it flowers earlier in the season than many other Wattles in southwest Western Australia. *Acacia splendens* is readily distinguished from both *A. microbotrya* and *A. daphnifolia* by its pruinose branchlets and pods (the trunks are also smooth and white-pruinose, at least on young plants), more numerous flowers per head, broader phyllodes (especially the juvenile ones) and narrowly oblong pods. It is further distinguished from *A. microbotrya* by its golden-coloured heads and from *A. daphnifolia* by its smaller seeds. Details of *A. microbotrya* and *A. daphnifolia* are given in Maslin (in prep.). Other differences between these taxa are given in Elliott *et al.* (2002; note that in this work *A. splendens* is referred to as '*A.* sp. Dandaragan' and *A. daphnifolia* as *A. microbotrya* var. *borealis*).

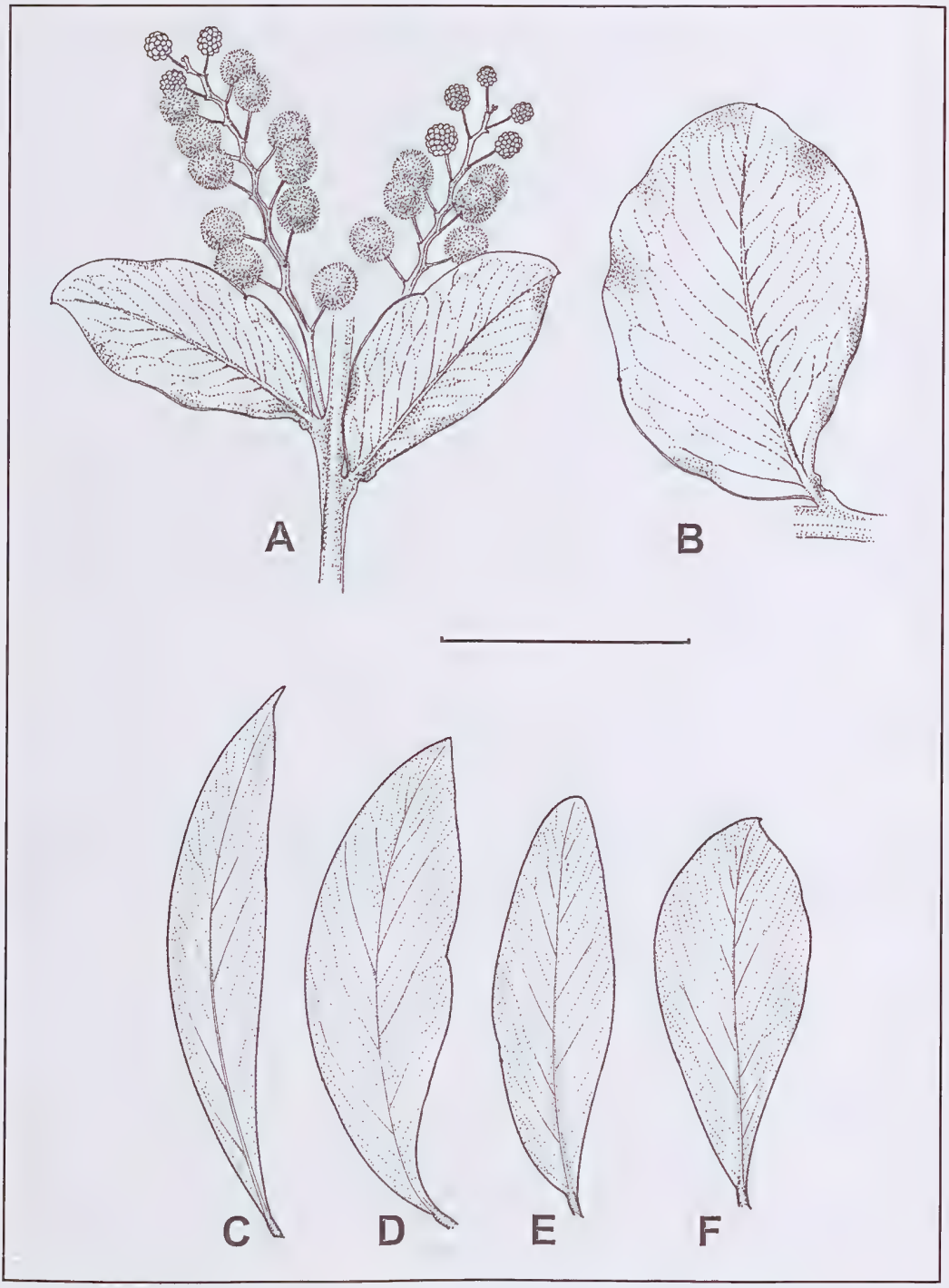


Figure 1. *Acacia splendens*. A – flowering branch (showing adolescent phyllodes), B to F – range of phyllodes showing variation at different growth stages (B – juvenile, C – adult, D to F – adolescent). A from *A. Popplewell s.n.* (PERTH 00720577), B from *B.R. Maslin* 6116, C from *B.R. Maslin* 5360, D from *C.P. Elliott* 4, E from *B.R. Maslin* 6024, F from *S.D. Hopper* 2378. Pods and seeds of the species are illustrated in Maslin (2001a and 2001b). Scale bar = 5cm.

*Characteristic features. Acacia splendens* is recognized by its glabrous, pruinose branchlets, 1-nerved phyllodes which are large, glaucous and ± undulate when young; many-flowered, golden heads that are arranged in showy racemes; narrowly oblong, variably pruinose pods and relatively small seeds that are encircled by a normally red–brown funicle. Perhaps the most striking feature of this new species is its great range of variation in phyllode shape and size with juvenile phyllodes significantly different in form from adult ones (see *Variation* below).

*Variation.* Phyllodes vary considerably in shape, size and curvature, and in the shape of their apices. This variation appears to be related to the biological maturity of the foliage which seems to vary independently of the actual age of the plants. For the purpose of this discussion the phyllodes are classed as juvenile, adolescent and adult (this same terminology has been used to describe phyllodes of the *A. aneura* group, fide Miller *et al.* 2002). The juvenile phyllodes (Figure 1B) are elliptic to obovate, very broad (generally 3–6(–8) cm wide with l:w = 1.5–3), ± undulate, coriaceous, glaucous, pruinose, straight and rounded-obtuse. Mature adult phyllodes are very different (Figure 1C), being narrowly elliptic to oblanceolate, narrower and more elongate (generally 1–3 cm wide with l:w = 4–8), not undulate, straight to shallowly recurved, more thinly textured, straight to shallowly recurved and acute to acuminate. These different phyllode forms, and many intermediates between them (i.e. adolescent phyllodes, see Figure 1A & D–F) occur on biologically mature plants (i.e. plants that produce flowers and fruits). It is not known what factors control the change in phyllode form, however, it appears not to be strictly correlated with the age of the plants. For example, shrubs as tall as 4 m with clearly mature (rough) bark may have only juvenile phyllodes, while seemingly young plants just 2 m tall with smooth stems may have adolescent phyllodes. Most biologically mature plants in the population have either juvenile or adolescent phyllodes and these are presumably neotenous; plants with the adult phyllode form are not common. Additionally, it is not uncommon to observe branches with adult phyllodes at the base giving way to adolescent or juvenile 'reversion' foliage higher up. Neoteny, or presumed neoteny, has been reported in species of the Mulga group (i.e. *A. aneura* and its allies, see Miller *et al.* 2002); it is also present in *A. daphnifolia*, a close relative of A. *splendens* (see below).

*Biology.* Judging from the performance of plants in cultivation in Perth, *A. splendens* has a fast growth rate and is relatively short-lived. For example, plants at Kings Park and Botanic Garden attained a height of about 10 m with a basal trunk diameter of 26 cm in 13 years while the most vigorous plants grown at the Western Australian Herbarium attained 5 m in height with a basal trunk diameters of 15 cm in about 5 years. Interestingly, in both these cases the bark on the main trunks was smooth and white-pruinose; the distinctive rough dark-coloured bark which is found on most plants in the wild presumably develops on older plants (although it is not known to what extent, if any, the growing conditions under cultivation influences bark development).

In nature plant recruitment occurs from both seeds (which are produced in great profusion) and by suckers (the level of clonality is unknown but it appears to be reasonably considerable). Elliott *et al.* (2002) showed that the size class structure of plants in the Dandaragan population shows a reverse J curve with a large number of small plants and a few large ones. Plants less than 30 cm tall were examined and 98.8% were found to be clonal ramets. The remaining 1.2% of plants were seedlings, indicating recruitment from a soil seed bank (20 ± 11.3seeds $m^{-2}$) in the population. Germination physiology of *A. splendens* showed the seed to have a reasonably high level of non-dormancy, with non-scarified seeds germinating at a rate of 61.2% ±6.41 and scarified seeds at 94% ±1.86. The effect of thermal shock on germination for *A. splendens* was similar to the non-scarified seeds, indicating that thermal shock does not simulate scarification. Nevertheless, the seed was resistant to thermal shock up to 80°C, but germination declined at higher temperatures.

Further information on the ecology, population structure and life history of *A. splendens* is provided by Elliott *et al.* (2002).

## Acknowledgements

We wish to express our appreciation of the efforts of the late Mr Alf Popplewell who brought the species to the attention of the first author in 1981. Mr Popplewell, who lived on the property 'Attunga' at Dandaragan, made some fine flowering and fruiting collections of this plant and through his explorations in the Dandaragan region was able to determine that it was likely to have a very restricted natural occurrence. It is unfortunate that the species was not able to be formally described prior to Mr Popplewell's death in November 2002. We also thank Paul Wilson for preparing the Latin description and Margaret Pieroni and Martin Thompson for illustrations Figure 1A–B and Figure 1C–F respectively. We also wish to than Dr Colin Yates and Dr Philip Ladd who were responsible for supervising the ecological and allozyme research conducted on the species in 2000 by the second author as part of a Conservation Biology Honours degree.

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